



SEQUENCE LISTING

<110> Rose, David
Kuntz, Douglas
Van Den Elsen, Jean

<120> MANNOSIDASE STRUCTURES

<130> 12243.19USU1

<140> US 09/960,226

<141> 2001-09-21

<150> US 60/263,458

<151> 2001-01-23

<150> US 60/234,879

<151> 2000-09-22

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<170> PatentIn version 3.1

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ctc	ggg	aga	tct	agc	cac	cat	cat	cat	cat	cac	gga	gaa	ttc	gac	gat	96
Leu	Gly	Arg	Ser	Ser	His	His	His	His	His	His	Gly	Glu	Phe	Asp	Asp	
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cca	ata	aga	cct	cca	ctt	aaa	gtg	gct	cgt	tcc	ccg	agg	cca	ggg	caa	144
Pro	Ile	Arg	Pro	Pro	Leu	Lys	Val	Ala	Arg	Ser	Pro	Arg	Pro	Gly	Gln	
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tgc	caa	gat	gtg	gtc	caa	gac	gtg	ccc	aat	gtg	gat	gta	cag	atg	ctg	192
Cys	Gln	Asp	Val	Val	Gln	Asp	Val	Pro	Asn	Val	Asp	Val	Gln	Met	Leu	
	50					55				60						

gag	cta	tac	gat	cgc	atg	tcc	ttc	aag	gac	ata	gat	gga	ggc	gtg	tgg	240
Glu	Leu	Tyr	Asp	Arg	Met	Ser	Phe	Lys	Asp	Ile	Asp	Gly	Gly	Val	Trp	
65					70				75					80		

aaa	cag	ggc	tgg	aac	att	aag	tac	gat	cca	ctg	aag	tac	aac	gcc	cat	288
Lys	Gln	Gly	Trp	Asn	Ile	Lys	Tyr	Asp	Pro	Leu	Lys	Tyr	Asn	Ala	His	
				85					90					95		

cac	aaa	cta	aaa	gtc	ttc	gtt	gtg	ccg	cac	tcg	cac	aac	gat	cct	gga	336
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His	Lys	Leu	Lys	Val	Phe	Val	Val	Pro	His	Ser	His	Asn	Asp	Pro	Gly	
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Trp	Ile	Gln	Thr	Phe	Glu	Glu	Tyr	Tyr	Gln	His	Asp	Thr	Lys	His	Ile	
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Leu	Ser	Asn	Ala	Leu	Arg	His	Leu	His	Asp	Asn	Pro	Glu	Met	Lys	Phe	
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Ile	Trp	Ala	Glu	Ile	Ser	Tyr	Phe	Ala	Arg	Phe	Tyr	His	Asp	Leu	Gly	
145					150					155					160	
gag	aac	aaa	aag	ctg	cag	atg	aag	tcc	att	gta	aag	aat	gga	cag	ttg	528
Glu	Asn	Lys	Lys	Leu	Gln	Met	Lys	Ser	Ile	Val	Lys	Asn	Gly	Gln	Leu	
				165					170					175		
gaa	ttg	gaa	ttt	gtg	act	gga	gga	tgg	gta	atg	ccg	gac	gag	gcc	aac	576
Glu	Leu	Glu	Phe	Val	Thr	Gly	Gly	Trp	Val	Met	Pro	Asp	Glu	Ala	Asn	
			180					185					190			
tcc	cac	tgg	cga	aac	gta	ctg	ctg	cag	ctg	acc	gaa	ggg	caa	aca	tgg	624
Ser	His	Trp	Arg	Asn	Val	Leu	Leu	Gln	Leu	Thr	Glu	Gly	Gln	Thr	Trp	
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ttg	aag	caa	ttc	atg	aat	gtc	aca	ccc	act	gct	tcc	tgg	gcc	atc	gat	672
Leu	Lys	Gln	Phe	Met	Asn	Val	Thr	Pro	Thr	Ala	Ser	Trp	Ala	Ile	Asp	
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ccc	ttc	gga	cac	agt	ccc	act	atg	ccg	tac	att	ttg	cag	aag	agt	ggg	720
Pro	Phe	Gly	His	Ser	Pro	Thr	Met	Pro	Tyr	Ile	Leu	Gln	Lys	Ser	Gly	
225					230					235					240	
ttc	aag	aat	atg	ctt	atc	caa	agg	acg	cac	tat	tcg	gtt	aag	aag	gaa	768
Phe	Lys	Asn	Met	Leu	Ile	Gln	Arg	Thr	His	Tyr	Ser	Val	Lys	Lys	Glu	
				245					250					255		
ctg	gcc	caa	cag	cga	cag	ctt	gag	ttc	ctg	tgg	cgc	cag	atc	tgg	gac	816
Leu	Ala	Gln	Gln	Arg	Gln	Leu	Glu	Phe	Leu	Trp	Arg	Gln	Ile	Trp	Asp	
			260					265					270			
aac	aaa	ggg	gac	aca	gct	ctc	ttc	acc	cac	atg	atg	ccc	ttc	tac	tcg	864
Asn	Lys	Gly	Asp	Thr	Ala	Leu	Phe	Thr	His	Met	Met	Pro	Phe	Tyr	Ser	
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Tyr	Asp	Ile	Pro	His	Thr	Cys	Gly	Pro	Asp	Pro	Lys	Val	Cys	Cys	Gln	
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ttc	gat	ttc	aaa	cga	atg	ggc	tcc	ttc	ggg	ttg	agt	tgt	cca	tgg	aag	960
Phe	Asp	Phe	Lys	Arg	Met	Gly	Ser	Phe	Gly	Leu	Ser	Cys	Pro	Trp	Lys	
305					310					315					320	
gtg	ccg	ccg	cgt	aca	atc	agt	gat	caa	aat	gtg	gca	gca	cgc	tca	gat	1008
Val	Pro	Pro	Arg	Thr	Ile	Ser	Asp	Gln	Asn	Val	Ala	Ala	Arg	Ser	Asp	
				325					330					335		
ctg	ctg	gtt	gat	cag	tgg	aag	aag	aag	gcc	gag	ctg	tat	cgc	aca	aac	1056

Leu	Leu	Val	Asp	Gln	Trp	Lys	Lys	Lys	Ala	Glu	Leu	Tyr	Arg	Thr	Asn		
			340					345					350				
gtg	ctg	ctg	att	ccg	ttg	ggg	gac	gac	ttc	cgc	ttc	aag	cag	aac	acc	1104	
Val	Leu	Leu	Ile	Pro	Leu	Gly	Asp	Asp	Phe	Arg	Phe	Lys	Gln	Asn	Thr		
			355				360					365					
gag	tgg	gat	gtg	cag	cgc	gtg	aac	tac	gaa	agg	ctg	ttc	gaa	cac	atc	1152	
Glu	Trp	Asp	Val	Gln	Arg	Val	Asn	Tyr	Glu	Arg	Leu	Phe	Glu	His	Ile		
			370				375					380					
aac	agc	cag	gcc	cac	ttc	aat	gtc	cag	gcg	cag	ttc	ggc	aca	ctg	cag	1200	
Asn	Ser	Gln	Ala	His	Phe	Asn	Val	Gln	Ala	Gln	Phe	Gly	Thr	Leu	Gln		
					390					395					400		
gaa	tac	ttt	gat	gca	gtg	cac	cag	gcg	gaa	agg	gcg	gga	caa	gcc	gag	1248	
Glu	Tyr	Phe	Asp	Ala	Val	His	Gln	Ala	Glu	Arg	Ala	Gly	Gln	Ala	Glu		
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ttt	ccc	acg	cta	agc	ggg	gac	ttt	ttc	aca	tac	gcc	gat	cga	tcg	gat	1296	
Phe	Pro	Thr	Leu	Ser	Gly	Asp	Phe	Phe	Thr	Tyr	Ala	Asp	Arg	Ser	Asp		
			420					425					430				
aac	tat	tgg	agt	ggc	tac	tac	aca	tcc	cgc	ccg	tat	cat	aag	cgc	atg	1344	
Asn	Tyr	Trp	Ser	Gly	Tyr	Tyr	Thr	Ser	Arg	Pro	Tyr	His	Lys	Arg	Met		
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gac	cgc	gtc	ctg	atg	cac	tat	gta	cgt	gca	gca	gaa	atg	ctt	tcc	gcc	1392	
Asp	Arg	Val	Leu	Met	His	Tyr	Val	Arg	Ala	Ala	Glu	Met	Leu	Ser	Ala		
			450				455					460					
tgg	cac	tcc	tgg	gac	ggg	atg	gcc	cgc	atc	gag	gaa	cgt	ctg	gag	cag	1440	
Trp	His	Ser	Trp	Asp	Gly	Met	Ala	Arg	Ile	Glu	Glu	Arg	Leu	Glu	Gln		
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gcc	cgc	agg	gag	ctg	tca	ttg	ttc	cag	cac	cac	gac	ggg	ata	act	ggc	1488	
Ala	Arg	Arg	Glu	Leu	Ser	Leu	Phe	Gln	His	His	Asp	Gly	Ile	Thr	Gly		
				485						490				495			
aca	gca	aaa	acg	cac	gta	gtc	gtc	gac	tac	gag	caa	cgc	atg	cag	gaa	1536	
Thr	Ala	Lys	Thr	His	Val	Val	Val	Asp	Tyr	Glu	Gln	Arg	Met	Gln	Glu		
			500					505					510				
gct	tta	aaa	gcc	tgt	caa	atg	gta	atg	caa	cag	tcg	gtc	tac	cga	ttg	1584	
Ala	Leu	Lys	Ala	Cys	Gln	Met	Val	Met	Gln	Gln	Ser	Val	Tyr	Arg	Leu		
			515				520					525					
ctg	aca	aag	ccc	tcc	atc	tac	agt	ccg	gac	ttc	agt	ttc	ycg	tac	ttt	1632	
Leu	Thr	Lys	Pro	Ser	Ile	Tyr	Ser	Pro	Asp	Phe	Ser	Phe	Xaa	Tyr	Phe		
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acg	ctc	gac	gac	tcc	cgc	tgg	cca	gga	tct	ggg	gtg	gag	gac	agt	cga	1680	
Thr	Leu	Asp	Asp	Ser	Arg	Trp	Pro	Gly	Ser	Gly	Val	Glu	Asp	Ser	Arg		
					550					555					560		
acc	acc	ata	ata	ctg	ggc	gag	gat	ata	ctg	ccc	tcc	aag	cat	gtg	gtg	1728	
Thr	Thr	Ile	Ile	Leu	Gly	Glu	Asp	Ile	Leu	Pro	Ser	Lys	His	Val	Val		
				565					570					575			
atg	cac	aac	acc	ctg	ccc	cac	tgg	cgg	gag	cag	ctg	gtg	gac	ttt	tat	1776	

Met	His	Asn	Thr	Leu	Pro	His	Trp	Arg	Glu	Gln	Leu	Val	Asp	Phe	Tyr		
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gta	tcc	agt	ccg	ttt	gta	agc	gtt	acc	gac	ttg	gca	aac	aat	ccg	gtg	1824	
Val	Ser	Ser	Pro	Phe	Val	Ser	Val	Thr	Asp	Leu	Ala	Asn	Asn	Pro	Val		
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gag	gct	cag	gtg	tcc	ccg	gtg	tgg	agc	tgg	cac	cac	gac	aca	ctc	aca	1872	
Glu	Ala	Gln	Val	Ser	Pro	Val	Trp	Ser	Trp	His	His	Asp	Thr	Leu	Thr		
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Lys	Thr	Ile	His	Pro	Gln	Gly	Ser	Thr	Thr	Lys	Tyr	Arg	Ile	Ile	Phe		
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Lys	Ala	Arg	Val	Pro	Pro	Met	Gly	Leu	Ala	Thr	Tyr	Val	Leu	Thr	Ile		
				645					650					655			
tcc	gat	tcc	aag	cca	gag	cac	acc	tcg	tat	gca	tcg	aat	ctc	ttg	ctc	2016	
Ser	Asp	Ser	Lys	Pro	Glu	His	Thr	Ser	Tyr	Ala	Ser	Asn	Leu	Leu	Leu		
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Lys	Phe	Gly	Asp	Pro	Arg	Glu	Ile	Ser	Leu	Arg	Val	Gly	Asn	Gly	Pro		
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Thr	Leu	Ala	Phe	Ser	Glu	Gln	Gly	Leu	Leu	Lys	Ser	Ile	Gln	Leu	Thr		
	705				710					715					720		
cag	gat	agc	cca	cat	gta	ccg	gtg	cac	ttc	aag	ttc	ctc	aag	tat	ggc	2208	
Gln	Asp	Ser	Pro	His	Val	Pro	Val	His	Phe	Lys	Phe	Leu	Lys	Tyr	Gly		
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ggt	cga	tcg	cat	ggc	gat	aga	tcc	ggt	gcc	tat	ctg	ttc	ctg	ccc	aat	2256	
Val	Arg	Ser	His	Gly	Asp	Arg	Ser	Gly	Ala	Tyr	Leu	Phe	Leu	Pro	Asn		
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gga	cca	gct	tcg	cca	gtc	gag	ctt	ggc	cag	cca	gtg	gtc	ctg	gtg	act	2304	
Gly	Pro	Ala	Ser	Pro	Val	Glu	Leu	Gly	Gln	Pro	Val	Val	Leu	Val	Thr		
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Lys	Gly	Lys	Leu	Glu	Ser	Ser	Val	Ser	Val	Gly	Leu	Pro	Ser	Val	Val		
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cac	cag	acg	ata	atg	cgc	ggt	ggt	gca	cct	gag	att	cgc	aat	ctg	gtg	2400	
His	Gln	Thr	Ile	Met	Arg	Gly	Gly	Ala	Pro	Glu	Ile	Arg	Asn	Leu	Val		
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gat	ata	ggc	tca	ctg	gac	aac	acg	gag	atc	gtg	atg	cgc	ttg	gag	acg	2448	
Asp	Ile	Gly	Ser	Leu	Asp	Asn	Thr	Glu	Ile	Val	Met	Arg	Leu	Glu	Thr		
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cat	atc	gac	agc	ggc	gat	atc	ttc	tac	acg	gat	ctc	aat	gga	ttg	caa	2496	

His Ile Asp Ser Gly Asp Ile Phe Tyr Thr Asp Leu Asn Gly Leu Gln	
820 825 830	
ttt atc aag agg cgg cgt ttg gac aaa tta cct ttg cag gcc aac tat	2544
Phe Ile Lys Arg Arg Arg Leu Asp Lys Leu Pro Leu Gln Ala Asn Tyr	
835 840 845	
tat ccc ata cct tcg ggt atg ttc att gag gat gcc aat acg cga ctc	2592
Tyr Pro Ile Pro Ser Gly Met Phe Ile Glu Asp Ala Asn Thr Arg Leu	
850 855 860	
act ctc ctc acg ggt caa ccg ctg ggt gga tct tct ctg gcc tcg ggc	2640
Thr Leu Leu Thr Gly Gln Pro Leu Gly Gly Ser Ser Leu Ala Ser Gly	
865 870 875 880	
gag cta gag att atg caa gat cgt cgc ctg gcc agc gat gat gaa cgc	2688
Glu Leu Glu Ile Met Gln Asp Arg Arg Leu Ala Ser Asp Asp Glu Arg	
885 890 895	
ggc ctg gga cag ggt gtt ttg gac aac aag ccg gtg ctg cat att tat	2736
Gly Leu Gly Gln Gly Val Leu Asp Asn Lys Pro Val Leu His Ile Tyr	
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cgg ctg gtg ctg gag aag gtt aac aac tgt gtc cga ccg tca aag ctt	2784
Arg Leu Val Leu Glu Lys Val Asn Asn Cys Val Arg Pro Ser Lys Leu	
915 920 925	
cat cct gcc ggc tat ttg aca agt gcc gca cac aaa gca tcg cag tca	2832
His Pro Ala Gly Tyr Leu Thr Ser Ala Ala His Lys Ala Ser Gln Ser	
930 935 940	
ctg ctg gat cca ctg gac aag ttt ata ttc gct gaa aat gag tgg atc	2880
Leu Leu Asp Pro Leu Asp Lys Phe Ile Phe Ala Glu Asn Glu Trp Ile	
945 950 955 960	
ggg gca cag ggg caa ttt ggt ggc gat cat cct tcg gct cgt gag gat	2928
Gly Ala Gln Gly Gln Phe Gly Gly Asp His Pro Ser Ala Arg Glu Asp	
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ctc gat gtg tcg gtg atg aga cgc tta acc aag agc tcg gcc aaa acc	2976
Leu Asp Val Ser Val Met Arg Arg Leu Thr Lys Ser Ser Ala Lys Thr	
980 985 990	
cag cga gta ggc tac gtt ctg cac cgc acc aat ctg atg caa tgc ggc	3024
Gln Arg Val Gly Tyr Val Leu His Arg Thr Asn Leu Met Gln Cys Gly	
995 1000 1005	
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Thr Pro Glu Glu His Thr Gln Lys Leu Asp Val Cys His Leu Leu	
1010 1015 1020	
ccg aat gtg gcg aga tgc gag gcg acg acg ctg act ttc ctg cag	3114
Pro Asn Val Ala Arg Cys Glu Ala Thr Thr Leu Thr Phe Leu Gln	
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aat ttg gag cac ttg gat ggc atg gtg gcg ccg gaa gtg tgc ccc	3159
Asn Leu Glu His Leu Asp Gly Met Val Ala Pro Glu Val Cys Pro	
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Met Glu Thr Ala Ala Tyr Val Ser Ser His Ser Ser
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Pro Ile Arg Pro Pro Leu Lys Val Ala Arg Ser Pro Arg Pro Gly Gln
 35 40 45

Cys Gln Asp Val Val Gln Asp Val Pro Asn Val Asp Val Gln Met Leu
 50 55 60

Glu Leu Tyr Asp Arg Met Ser Phe Lys Asp Ile Asp Gly Gly Val Trp
 65 70 75 80

Lys Gln Gly Trp Asn Ile Lys Tyr Asp Pro Leu Lys Tyr Asn Ala His
 85 90 95

His Lys Leu Lys Val Phe Val Val Pro His Ser His Asn Asp Pro Gly
 100 105 110

Trp Ile Gln Thr Phe Glu Glu Tyr Tyr Gln His Asp Thr Lys His Ile
 115 120 125

Leu Ser Asn Ala Leu Arg His Leu His Asp Asn Pro Glu Met Lys Phe
 130 135 140

Ile Trp Ala Glu Ile Ser Tyr Phe Ala Arg Phe Tyr His Asp Leu Gly
 145 150 155 160

Glu Asn Lys Lys Leu Gln Met Lys Ser Ile Val Lys Asn Gly Gln Leu
 165 170 175

Glu Leu Glu Phe Val Thr Gly Gly Trp Val Met Pro Asp Glu Ala Asn
 180 185 190

Ser His Trp Arg Asn Val Leu Leu Gln Leu Thr Glu Gly Gln Thr Trp
 195 200 205

Leu Lys Gln Phe Met Asn Val Thr Pro Thr Ala Ser Trp Ala Ile Asp
 210 215 220

Pro Phe Gly His Ser Pro Thr Met Pro Tyr Ile Leu Gln Lys Ser Gly
 225 230 235 240

Phe Lys Asn Met Leu Ile Gln Arg Thr His Tyr Ser Val Lys Lys Glu
 245 250 255

Leu Ala Gln Gln Arg Gln Leu Glu Phe Leu Trp Arg Gln Ile Trp Asp
 260 265 270

Asn Lys Gly Asp Thr Ala Leu Phe Thr His Met Met Pro Phe Tyr Ser
 275 280 285

Tyr Asp Ile Pro His Thr Cys Gly Pro Asp Pro Lys Val Cys Cys Gln
 290 295 300

Phe Asp Phe Lys Arg Met Gly Ser Phe Gly Leu Ser Cys Pro Trp Lys
 305 310 315 320

Val Pro Pro Arg Thr Ile Ser Asp Gln Asn Val Ala Ala Arg Ser Asp
 325 330 335

Leu Leu Val Asp Gln Trp Lys Lys Lys Ala Glu Leu Tyr Arg Thr Asn
 340 345 350

Val Leu Leu Ile Pro Leu Gly Asp Asp Phe Arg Phe Lys Gln Asn Thr
 355 360 365

Glu Trp Asp Val Gln Arg Val Asn Tyr Glu Arg Leu Phe Glu His Ile
 370 375 380

Asn Ser Gln Ala His Phe Asn Val Gln Ala Gln Phe Gly Thr Leu Gln
 385 390 395 400

Glu Tyr Phe Asp Ala Val His Gln Ala Glu Arg Ala Gly Gln Ala Glu
 405 410 415

Phe Pro Thr Leu Ser Gly Asp Phe Phe Thr Tyr Ala Asp Arg Ser Asp
420 425 430
Asn Tyr Trp Ser Gly Tyr Tyr Thr Ser Arg Pro Tyr His Lys Arg Met
435 440 445
Asp Arg Val Leu Met His Tyr Val Arg Ala Ala Glu Met Leu Ser Ala
450 455 460
Trp His Ser Trp Asp Gly Met Ala Arg Ile Glu Glu Arg Leu Glu Gln
465 470 475 480
Ala Arg Arg Glu Leu Ser Leu Phe Gln His His Asp Gly Ile Thr Gly
485 490 495
Thr Ala Lys Thr His Val Val Val Asp Tyr Glu Gln Arg Met Gln Glu
500 505 510
Ala Leu Lys Ala Cys Gln Met Val Met Gln Gln Ser Val Tyr Arg Leu
515 520 525
Leu Thr Lys Pro Ser Ile Tyr Ser Pro Asp Phe Ser Phe Xaa Tyr Phe
530 535 540
Thr Leu Asp Asp Ser Arg Trp Pro Gly Ser Gly Val Glu Asp Ser Arg
545 550 555 560
Thr Thr Ile Ile Leu Gly Glu Asp Ile Leu Pro Ser Lys His Val Val
565 570 575
Met His Asn Thr Leu Pro His Trp Arg Glu Gln Leu Val Asp Phe Tyr
580 585 590
Val Ser Ser Pro Phe Val Ser Val Thr Asp Leu Ala Asn Asn Pro Val
595 600 605
Glu Ala Gln Val Ser Pro Val Trp Ser Trp His His Asp Thr Leu Thr
610 615 620
Lys Thr Ile His Pro Gln Gly Ser Thr Thr Lys Tyr Arg Ile Ile Phe
625 630 635 640
Lys Ala Arg Val Pro Pro Met Gly Leu Ala Thr Tyr Val Leu Thr Ile
645 650 655

Ser Asp Ser Lys Pro Glu His Thr Ser Tyr Ala Ser Asn Leu Leu Leu
 660 665 670

Arg Lys Asn Pro Thr Ser Leu Pro Leu Gly Gln Tyr Pro Glu Asp Val
 675 680 685

Lys Phe Gly Asp Pro Arg Glu Ile Ser Leu Arg Val Gly Asn Gly Pro
 690 695 700

Thr Leu Ala Phe Ser Glu Gln Gly Leu Leu Lys Ser Ile Gln Leu Thr
 705 710 715 720

Gln Asp Ser Pro His Val Pro Val His Phe Lys Phe Leu Lys Tyr Gly
 725 730 735

Val Arg Ser His Gly Asp Arg Ser Gly Ala Tyr Leu Phe Leu Pro Asn
 740 745 750

Gly Pro Ala Ser Pro Val Glu Leu Gly Gln Pro Val Val Leu Val Thr
 755 760 765

Lys Gly Lys Leu Glu Ser Ser Val Ser Val Gly Leu Pro Ser Val Val
 770 775 780

His Gln Thr Ile Met Arg Gly Gly Ala Pro Glu Ile Arg Asn Leu Val
 785 790 795 800

Asp Ile Gly Ser Leu Asp Asn Thr Glu Ile Val Met Arg Leu Glu Thr
 805 810 815

His Ile Asp Ser Gly Asp Ile Phe Tyr Thr Asp Leu Asn Gly Leu Gln
 820 825 830

Phe Ile Lys Arg Arg Arg Leu Asp Lys Leu Pro Leu Gln Ala Asn Tyr
 835 840 845

Tyr Pro Ile Pro Ser Gly Met Phe Ile Glu Asp Ala Asn Thr Arg Leu
 850 855 860

Thr Leu Leu Thr Gly Gln Pro Leu Gly Gly Ser Ser Leu Ala Ser Gly
 865 870 875 880

Glu Leu Glu Ile Met Gln Asp Arg Arg Leu Ala Ser Asp Asp Glu Arg
 885 890 895

Gly Leu Gly Gln Gly Val Leu Asp Asn Lys Pro Val Leu His Ile Tyr
900 905 910

Arg Leu Val Leu Glu Lys Val Asn Asn Cys Val Arg Pro Ser Lys Leu
915 920 925

His Pro Ala Gly Tyr Leu Thr Ser Ala Ala His Lys Ala Ser Gln Ser
930 935 940

Leu Leu Asp Pro Leu Asp Lys Phe Ile Phe Ala Glu Asn Glu Trp Ile
945 950 955 960

Gly Ala Gln Gly Gln Phe Gly Gly Asp His Pro Ser Ala Arg Glu Asp
965 970 975

Leu Asp Val Ser Val Met Arg Arg Leu Thr Lys Ser Ser Ala Lys Thr
980 985 990

Gln Arg Val Gly Tyr Val Leu His Arg Thr Asn Leu Met Gln Cys Gly
995 1000 1005

Thr Pro Glu Glu His Thr Gln Lys Leu Asp Val Cys His Leu Leu
1010 1015 1020

Pro Asn Val Ala Arg Cys Glu Ala Thr Thr Leu Thr Phe Leu Gln
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Asn Leu Glu His Leu Asp Gly Met Val Ala Pro Glu Val Cys Pro
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Met Glu Thr Ala Ala Tyr Val Ser Ser His Ser Ser
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Asp Val Val Asp Gln Val Pro Asn Val Asp Gln Met Leu Glu Leu Tyr
10

35

40

45

Asp Arg Met Ser Phe Lys Asp Ile Asp Gly Gly Val Trp Lys Gln Gly
 50 55 60

Trp Asn Ile Lys Tyr Asp Pro Leu Lys Tyr Asn Ala His His Lys Leu
 65 70 75 80

Lys Val Phe Val Val Pro His Ser His Asn Asp Pro Gly Trp Ile Gln
 85 90 95

Thr Phe Glu Glu Tyr Tyr Gln His Asp Thr Lys His Ile Leu Ser Asn
 100 105 110

Ala Leu Arg His Leu His Asp Asn Pro Glu Met Lys Phe Ile Trp Ala
 115 120 125

Glu Ile Ser Tyr Phe Ala Arg Phe Tyr His Asp Leu Gly Glu Asn Lys
 130 135 140

Lys Leu Gln Met Lys Ser Ile Val Lys Asn Gly Gln Leu Glu Phe Val
 145 150 155 160

Thr Gly Gly Trp Val Met Pro Asp Glu Ala Asn Ser His Trp Arg Asn
 165 170 175

Val Leu Leu Gln Leu Thr Glu Gly Gln Thr Trp Leu Lys Gln Phe Met
 180 185 190

Asn Val Thr Pro Thr Ala Ser Trp Ile Asp Pro Phe Gly His Ser Pro
 195 200 205

Thr Met Pro Tyr Ile Leu Gln Lys Ser Gly Phe Lys Asn Met Leu Ile
 210 215 220

Gln Arg Thr His Tyr Ser Val Lys Lys Glu Leu Ala Gln Gln Arg Gln
 225 230 235 240

Leu Glu Phe Leu Trp Arg Gln Ile Trp Asp Asn Lys Gly Asp Thr Ala
 245 250 255

Leu Phe Thr His Met Met Pro Phe Tyr Ser Tyr Asp Ile Pro His Thr
 260 265 270

Cys Gly Pro Asp Pro Lys Val Cys Cys Gln Phe Asp Phe Lys Arg Met

275	280	285
Gly Ser Phe Gly Leu Ser Cys Pro Trp Lys Val Pro Pro Arg Thr Ile 290 295 300		
Ser Asp Gln Asn Val Ala Ala Arg Ser Asp Leu Leu Val Asp Gln Trp 305 310 315 320		
Lys Lys Lys Ala Glu Leu Tyr Arg Thr Asn Val Leu Leu Ile Pro Leu 325 330 335		
Gly Asp Asp Phe Arg Phe Lys Gln Asn Thr Glu Trp Asp Val Gln Arg 340 345 350		
Val Asn Tyr Glu Arg Leu Phe Glu His Ile Asn Ser Gln Ala His Phe 355 360 365		
Asn Val Gln Ala Gln Phe Gly Thr Gln Glu Tyr Phe Asp Ala Val His 370 375 380		
Gln Ala Glu Arg Ala Gly Gln Ala Ala Glu Phe Pro Thr Leu Ser Gly 385 390 395 400		
Asp Phe Phe Thr Tyr Ala Asp Arg Ser Asp Asn Tyr Trp Ser Gly Tyr 405 410 415		
Tyr Thr Ser Arg Pro Tyr His Lys Arg Met Asp Arg Val Leu Met His 420 425 430		
Tyr Val Arg Ala Ala Glu Met Leu Ser Ala Trp His Ser Trp Asp Gly 435 440 445		
Met Ala Arg Ile Glu Glu Arg Leu Glu Gln Ala Arg Arg Glu Leu Ser 450 455 460		
Leu Phe Gln His His Asp Gly Ile Thr Gly Thr Ala Lys Thr His Val 465 470 475 480		
Val Val Asp Tyr Glu Gln Arg Met Gln Glu Ala Leu Lys Ala Cys Gln 485 490 495		
Met Val Met Met Gln Gln Ser Val Tyr Arg Leu Leu Thr Lys Pro Ser 500 505 510		
Ile Tyr Ser Pro Asp Phe Ser Phe Ser Tyr Phe Thr Leu Asp Asp Ser		

515					520					525					
Arg	Trp	Pro	Gly	Ser	Gly	Val	Glu	Asp	Ser	Arg	Thr	Thr	Ile	Ile	Leu
530					535					540					
Gly	Glu	Asp	Ile	Leu	Pro	Ser	Lys	His	Val	Val	Met	His	Asn	Thr	Leu
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Pro	His	Trp	Arg	Glu	Gln	Leu	Val	Asp	Phe	Tyr	Val	Ser	Ser	Pro	Phe
				565					570					575	
Val	Ser	Val	Thr	Asp	Leu	Ala	Asn	Asn	Pro	Val	Glu	Ala	Gln	Val	Ser
			580					585					590		
Pro	Val	Trp	Ser	Trp	His	His	Asp	Thr	Leu	Thr	Lys	Thr	Ile	His	Pro
		595					600					605			
Gln	Gly	Ser	Thr	Thr	Lys	Tyr	Arg	Ile	Ile	Phe	Lys	Ala	Arg	Val	Pro
610					615					620					
Pro	Met	Gly	Leu	Ala	Thr	Tyr	Val	Leu	Thr	Ile	Ser	Lys	Ser	Lys	Pro
625					630					635					640
Glu	His	Thr	Ser	Tyr	Ala	Ser	Asn	Leu	Leu	Leu	Arg	Lys	Asn	Pro	Thr
				645				650					655		
Ser	Leu	Pro	Leu	Gly	Gln	Tyr	Pro	Glu	Asp	Val	Lys	Phe	Gly	Asp	Pro
			660					665					670		
Arg	Glu	Ile	Ser	Leu	Arg	Val	Gly	Asn	Gly	Pro	Thr	Leu	Ala	Phe	Ser
		675					680					685			
Glu	Gln	Gly	Leu	Leu	Lys	Ser	Ile	Gln	Leu	Thr	Gln	Asp	Ser	Pro	His
690					695						700				
Val	Pro	Val	His	Phe	Lys	Phe	Leu	Lys	Tyr	Gly	Val	Arg	Ser	His	Gly
705					710					715					720
Asp	Arg	Ser	Gly	Ala	Tyr	Leu	Phe	Leu	Pro	Asn	Gly	Pro	Ala	Ser	Pro
				725					730					735	
Val	Glu	Leu	Gly	Gln	Pro	Val	Val	Leu	Val	Thr	Lys	Gly	Lys	Leu	Glu
			740					745					750		
Ser	Ser	Val	Ser	Val	Gly	Leu	Pro	Ser	Val	Val	His	Gln	Thr	Ile	Met

755	760	765
Arg Gly Gly Ala Pro Glu Ile Arg Asn Leu Val Asp Ile Gly Ser Leu 770 775 780		
Asp Asn Thr Glu Ile Val Met Arg Leu Glu Thr His Ile Asp Ser Gly 785 790 795 800		
Asp Ile Phe Tyr Thr Asp Leu Asn Gly Leu Gln Phe Ile Lys Arg Arg 805 810 815		
Arg Leu Asp Lys Leu Pro Leu Gln Ala Asn Tyr Tyr Pro Ile Pro Ser 820 825 830		
Gly Met Phe Ile Glu Asp Ala Asn Thr Arg Leu Thr Leu Leu Thr Gly 835 840 845		
Gln Pro Leu Gly Gly Ser Ser Leu Ala Ser Gly Glu Leu Glu Ile Met 850 855 860		
Gln Asp Arg Arg Leu Ala Ser Asp Asp Glu Arg Gly Leu Gly Gln Gly 865 870 875 880		
Val Leu Asp Asn Lys Pro Val Leu His Ile Tyr Arg Leu Val Leu Glu 885 890 895		
Lys Val Asn Asn Cys Val Arg Pro Ser Lys Leu His Pro Ala Gly Tyr 900 905 910		
Leu Thr Ser Ala Ala His Lys Ala Ser Gln Ser Leu Leu Asp Pro Leu 915 920 925		
Asp Lys Phe Ile Phe Ala Glu Asn Glu Trp Ile Gly Ala Gln Gly Gln 930 935 940		
Phe Gly Gly Asp His Pro Ser Ala Arg Glu Asp Leu Asp Val Ser Val 945 950 955 960		
Met Arg Arg Leu Thr Lys Ser Ser Ala Lys Thr Gln Arg Val Gly Tyr 965 970 975		
Val Leu His Arg Thr Asn Leu Met Gln Cys Gly Thr Pro Glu Glu His 980 985 990		
Thr Gln Lys Leu Asp Val Cys His Leu Leu Pro Asn Val Ala Arg Cys		

995 1000 1005
 Glu Arg Thr Thr Leu Thr Phe Leu Gln Asn Leu Glu His Leu Asp
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 Gly Met Val Ala Pro Glu Val Cys Pro Met Glu Thr Ala Ala Tyr
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 Val Ser Ser His Ser Ser
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 Val Val Glu Asp Gly Pro Lys Ser Ser Gln Ser Asn Phe Ser Gln Gly
 35 40 45
 Ala Gly Ser His Leu Leu Pro Ser Gln Leu Ser Ser Val Asp Thr Ala
 50 55 60
 Asp Cys Leu Phe Ala Ser Gln Ser Gly Ser His Asn Ser Asp Val Gln
 65 70 75 80
 Met Leu Asp Val Tyr Ser Leu Ile Ser Phe Asp Asn Pro Asp Gly Gly
 85 90 95
 Val Trp Lys Gln Gly Phe Asp Ile Thr Tyr Glu Ser Asn Glu Trp Asp
 100 105 110
 Thr Glu Pro Leu Gln Val Phe Val Val Pro His Ser His Asn Asp Pro
 115 120 125
 Gly Trp Leu Lys Thr Phe Asn Asp Tyr Phe Arg Asp Lys Thr Gln Tyr
 130 135 140
 Ile Phe Asn Asn Met Val Leu Lys Leu Lys Glu Asp Ser Arg Arg Lys
 145 150 155 160

Phe Ile Trp Ser Glu Ile Ser Tyr Leu Ser Lys Trp Trp Asp Ile Ile
165 170 175

Asp Ile Gln Lys Lys Asp Ala Val Lys Ser Leu Glu Asn Gly Gln Leu
180 185 190

Glu Ile Val Thr Gly Gly Trp Val Met Pro Asp Glu Ala Thr Pro His
195 200 205

Tyr Phe Ala Leu Ile Asp Gln Leu Ile Glu Gly His Gln Glu Leu Glu
210 215 220

Asn Asn Ile Gly Val Lys Pro Arg Ser Gly Trp Ala Ile Asp Pro Phe
225 230 235 240

Gly His Ser Pro Thr Met Ala Tyr Leu Leu Asn Arg Ala Gly Leu Ser
245 250 255

His Met Leu Ile Gln Arg Val His Tyr Ala Val Lys Lys His Phe Ala
260 265 270

Leu His Lys Thr Leu Glu Phe Phe Trp Arg Gln Asn Trp Asp Leu Gly
275 280 285

Ser Val Thr Asp Ile Leu Cys His Met Met Pro Phe Tyr Ser Tyr Asp
290 295 300

Ile Pro Gly His Cys Gly Pro Asp Pro Lys Ile Cys Cys Gln Phe Asp
305 310 315 320

Phe Lys Arg Leu Pro Gly Gly Arg Phe Gly Cys Pro Gln Gly Val Pro
325 330 335

Pro Glu Thr Ile His Pro Gly Asn Val Gln Ser Arg Ala Arg Met Leu
340 345 350

Leu Asp Gln Tyr Arg Lys Lys Ser Lys Leu Phe Arg Thr Lys Val Leu
355 360 365

Leu Ala Pro Leu Gly Asp Asp Phe Arg Tyr Cys Glu Tyr Thr Glu Trp
370 375 380

Asp Leu Gln Phe Lys Asn Tyr Gln Gln Leu Phe Asp Tyr Met Asn Ser
385 390 395 400

Gln Ser Lys Phe Lys Val Lys Ile Gln Phe Gly Thr Leu Ser Asp Phe
 405 410 415
 Phe Asp Ala Leu Asp Lys Ala Asp Glu Thr Gln Arg Asp Lys Ser Gly
 420 425 430
 Gln Ser Met Phe Pro Val Leu Ser Gly Asp Phe Phe Thr Tyr Ala Asp
 435 440 445
 Arg Asp Asp His Tyr Trp Ser Gly Tyr Phe Thr Ser Arg Pro Phe Tyr
 450 455 460
 Arg Lys Met Arg Asp Arg Ile Met Glu Ser His Leu Arg Ala Ala Glu
 465 470 475 480
 Ile Leu Tyr Tyr Phe Ala Leu Arg Gln Ala His Lys Tyr Lys Ile Asn
 485 490 495
 Lys Phe Leu Ser Ser Ser Leu Tyr Thr Ala Leu Thr Glu Arg Ala Arg
 500 505 510
 Asn Leu Gly Leu Phe Gln His His Asp Ala Ile Thr Gly Thr Ala Lys
 515 520 525
 Asp Trp Val Val Val Asp Tyr Gly Thr Arg Leu Phe His Ser Leu Met
 530 535 540
 Val Leu Glu Lys Ile Ile Gly Asn Ser Ala Phe Leu Leu Ile Gly Lys
 545 550 555 560
 Asp Lys Leu Thr Tyr Asp Ser Tyr Ser Pro Asp Thr Phe Leu Glu Met
 565 570 575
 Asp Leu Lys Gln Lys Ser Gln Asp Ser Leu Pro Gln Lys Asn Ile Ile
 580 585 590
 Arg Leu Ser Ala Glu Pro Arg Tyr Leu Val Val Tyr Asn Asn Pro Leu
 595 600 605
 Glu Gln Asp Arg Ile Ser Leu Val Ser Val Tyr Val Ser Ser Pro Thr
 610 615 620
 Val Gln Val Phe Ser Ala Ser Gly Lys Pro Val Glu Val Gln Val Ser
 625 630 635 640

Ala Val Trp Asp Thr Ala Asn Thr Ile Ser Glu Thr Ala Tyr Glu Ile
 645 650 655

Ser Phe Arg Ala His Ile Pro Pro Leu Gly Leu Lys Val Tyr Lys Ile
 660 665 670

Leu Glu Ser Ala Ser Ser Asn Ser His Leu Ala Asp Tyr Val Leu Tyr
 675 680 685

Lys Asn Lys Val Glu Asp Ser Gly Ile Phe Thr Ile Lys Asn Met Ile
 690 695 700

Asn Thr Glu Glu Gly Ile Thr Leu Glu Asn Ser Phe Val Leu Leu Arg
 705 710 715 720

Phe Asp Gln Thr Gly Leu Met Lys Gln Met Met Thr Lys Glu Asp Gly
 725 730 735

Lys His His Glu Val Asn Val Gln Phe Ser Trp Tyr Gly Thr Thr Ile
 740 745 750

Lys Arg Asp Lys Ser Gly Ala Tyr Leu Phe Leu Pro Asp Gly Asn Ala
 755 760 765

Lys Pro Tyr Val Tyr Thr Thr Pro Pro Phe Val Arg Val Thr His Gly
 770 775 780

Arg Ile Tyr Ser Glu Val Thr Cys Phe Phe Asp His Val Thr His Arg
 785 790 795 800

Val Arg Leu Tyr His Ile Gln Gly Ile Glu Gly Gln Ser Val Glu Val
 805 810 815

Ser Asn Ile Val Asp Ile Arg Lys Val Tyr Asn Arg Glu Ile Ala Met
 820 825 830

Lys Ile Ser Ser Asp Ile Lys Ser Gln Asn Arg Phe Tyr Thr Asp Leu
 835 840 845

Asn Gly Tyr Gln Ile Gln Pro Arg Met Thr Leu Ser Lys Leu Pro Leu
 850 855 860

Gln Ala Asn Val Tyr Pro Met Thr Thr Met Ala Tyr Ile Gln Asp Ala
 865 870 875 880

Lys His Arg Leu Thr Leu Leu Ser Ala Gln Ser Leu Gly Val Ser Ser
 885 890 895
 Leu Asn Ser Gly Gln Ile Glu Val Ile Met Asp Arg Arg Leu Met Gln
 900 905 910
 Asp Asp Asn Arg Gly Leu Glu Gln Gly Ile Gln Asp Asn Lys Ile Thr
 915 920 925
 Ala Asn Leu Phe Arg Ile Leu Leu Glu Lys Arg Ser Ala Val Asn Thr
 930 935 940
 Glu Glu Glu Lys Lys Ser Val Ser Tyr Pro Ser Leu Leu Ser His Ile
 945 950 955 960
 Thr Ser Ser Leu Met Asn His Pro Val Ile Pro Met Ala Asn Lys Phe
 965 970 975
 Ser Ser Pro Thr Leu Glu Leu Gln Gly Glu Phe Ser Pro Leu Gln Ser
 980 985 990
 Ser Leu Pro Cys Asp Ile His Leu Val Asn Leu Arg Thr Ile Gln Ser
 995 1000 1005
 Lys Val Gly Asn Gly His Ser Asn Glu Ala Ala Leu Ile Leu His
 1010 1015 1020
 Arg Lys Gly Phe Asp Cys Arg Phe Ser Ser Lys Gly Thr Gly Leu
 1025 1030 1035
 Phe Cys Ser Thr Thr Gln Gly Lys Ile Leu Val Gln Lys Leu Leu
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 Asn Lys Phe Ile Val Glu Ser Leu Thr Pro Ser Ser Leu Ser Leu
 1055 1060 1065
 Met His Ser Pro Pro Gly Thr Gln Asn Ile Ser Glu Ile Asn Leu
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 Ser Pro Met Glu Ile Ser Thr Phe Arg Ile Gln Leu Arg
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Val Phe Val Val Pro His Ser His Asn Asp
1 5 10

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<400> 7

Trp Ala Ile Asp Pro Phe Gly His
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<400> 8

His Met Met Pro Phe Tyr Ser Tyr Asp Ile Pro His Thr Cys Gly Pro
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Asp Pro Lys Xaa Cys Cys Gln Phe Asp Phe Lys Arg
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